In the Claims

1. (Currently Amended) A system to de-ice a recondensor of an ~~MR~~ Magnetic Resonance (MR) system comprising:

an MR system having a superconducting magnet in a sealed vessel; and

a recondensing system configured to cool the superconducting magnet including:

at least one heating element configured to melt iced particles from the recondensing system; and

a power delivery circuit configured to deliver power to the at least one heating element such that the at least one heating element delivers a supply of heat sufficient to melt the iced particles from the recondensing system.

2. (Original) The system of claim 1 further comprising a vacuum supply configured to remove the melted particles from the recondensing system.

3. (Original) The system of claim 2 wherein the vacuum supply is configured to remove sublimated particles through an auxiliary cooling loop.

4. (Original) The system of claim 2 further comprising:

a vacuum supply valve connected to the recondensing system through a cooling loop and configured to control the vacuum supply; and

pressure gauge connected to the vacuum supply valve.

5. (Original) The system of claim 4 wherein the pressure gauge is configured to indicate when the vacuum supply valve should be actuated.

6. (Original) The system of claim 4 wherein the vacuum supply valve and pressure gauge are configured to replace a pressure release valve upon an indication of a pressure build-up indicative of recondensor icing.

7. (Original) The system of claim 1 wherein the sealed vessel is pressure-sealed against entry of atmospheric air.

8. (Currently Amended) The system of claim 7 wherein the power delivery circuit is configured to deliver power to the at least one heating element through an electrical

feedthrough into the pressure-sealed vessel, such that the at least one element generates heat when a power supply is connected to the power ~~deliver~~ delivery circuit.

9. (Original) The system of claim 7 wherein the pressure-sealed vessel is configured to remain pressure sealed while the iced particles are melted.

10. (Original) A recondensor system of an MR system comprising:

a superconducting magnet immersed in a bath of liquid coolant;

a recondensor configured to cool gaseous coolant evaporated from the bath to liquid coolant;

a supply tube connected to the recondensor and configured to deliver gaseous coolant to the recondensor;

a delivery tube connected to the recondensor and configured to remove liquid coolant from the recondensor; and

at least one resistive element configured to selectively deliver a supply of heat to at least one of the recondensor, the supply tube, and the delivery tube to melt ice particles.

11. (Original) The system of claim 10 wherein the recondensor includes a plurality of heat exchanging fins to cool gaseous coolant and is configured to be cooled by a closed-cycle refrigerator.

12. (Original) The system of claim 10 wherein the at least one resistive element includes a first resistive component, a second resistive component, and a third resistive component and wherein the first resistive component is configured to de-ice the recondensor, the second resistive component is configured to de-ice the supply tube, and the third resistive component is configured to de-ice the delivery tube.

13. (Original) The system of claim 12 wherein the first resistive component has a first effective resistance value, the second resistive component has a second effective resistance value, and the third resistive component has a third effective resistance value and wherein the first effective resistance value is approximately equal to the sum of the second and the third effective resistance values.

14. (Original) The system of claim 13 wherein the effective resistance value of the second resistive component is approximately equal to the effective resistance value of the third resistive component.

15. (Original) The system of claim 10 further comprising a power circuit configured to deliver power to the at least one resistive heating element such that the at least one resistive heating element delivers a supply of heat sufficient to melt the iced particles.

16. (Original) The system of claim 10 wherein at least one of the supply tube and the delivery tube is configured to receive a vacuum evacuation port such that the melted ice particles are removed through the vacuum evacuation port.

17. (Original) An MRI apparatus comprising:

an MRI system having a plurality of gradient coils positioned about a bore of a superconducting magnet to impress a polarizing magnetic field, and an RF transceiver system and an RF switch controlled by a pulse module to transmit RF signals to an RF coil assembly to acquire MR images; and

a cooling system arranged about the superconducting magnet and including:

a sealed chamber forming a cooling jacket configured to pool coolant around the superconducting magnet;

a recondensor connected to the cooling jacket and configured to condense evaporated coolant; and

at least one heating component configured to de-ice the recondensor.

18. (Original) The apparatus of claim 17 wherein the cooling system further includes an evacuation port configured to remove vapor from the sealed chamber that is released from de-icing the recondensor.

19. (Original) The apparatus of claim 18 wherein the at least one heating component includes a plurality of induction components which are configured to receive power to de-ice the recondensor through an electrical feedthrough.

20. (Original) The apparatus of claim 19 wherein the sealed chamber forms a pressure seal around the superconducting magnet and wherein the electrical feedthrough and the evacuation port pass through the pressure seal.

21. (Original) The apparatus of claim 17 wherein the cooling system further comprises an evaporated coolant supply channel to deliver evaporated coolant from a coolant vessel to the recondensor and a condensed coolant supply channel to deliver condensed coolant from the recondensor to the coolant vessel.

22. (Original) The apparatus of claim 21 wherein at least one heating component includes a first resistive component, a second resistive component, and a third resistive component and wherein the first resistive component is configured to de-ice the recondensor, the second resistive component is configured to de-ice the evaporated coolant supply channel, and the third resistive component is configured to de-ice the condensed coolant supply channel.

23. (Original) The apparatus of claim 22 the cooling system further includes an evacuation port configured to remove vapor released from de-icing the recondensor, the evaporated coolant supply channel, and the condensed coolant supply channel.

24. (Original) The apparatus of claim 23 wherein the evacuation port is configured to be connected to an auxiliary cooling loop and wherein the auxiliary cooling loop is configured to be connected to the evaporated coolant supply channel.

25. (Original) The apparatus of claim 21 wherein the at least one induction heating component is mounted to at least one of the recondensor, the evaporated coolant supply channel, and the condensed coolant supply channel.

26. (Original) A method of non-invasive de-icing of a recondensor system of a superconducting MR magnet assembly comprising the steps of:

heating portions of a recondensing system to melt ice deposits on at least the recondensing system, wherein the recondensing system is configured to condense a coolant of a superconducting MR magnet system; and

vacuumously removing melted ice deposits.

27. (Original) The method of claim 26 wherein the step of heating portions of a recondensing system to melt ice deposits includes sublimating the ice deposits and the step of vacuumously removing includes vacuumously removing the sublimated ice deposits.

28. (Original) The method of claim 26 wherein the step of heating portions of the recondensing system further comprises the step of connecting a power source to feed electrical energy to heating components under a pressure seal of a vacuum vessel without breaking the pressure seal and energizing the heating components via the electrical energy.

29. (Original) The method of claim 26 wherein the step of vacuumously removing further comprises connecting a vacuum pump to a bypass of a cooling loop to bypass the recondensing system.

30. (Original) The method of claim 29 wherein the step of vacuumously removing melted ice deposits include removing gas particles and is performed until a coolant flow is returned to the cooling loop.

31. (Original) The method of claim 26 wherein the steps of heating portions of the recondensing system and vacuumously removing gas are performed without quenching a superconducting MR magnet of the superconducting MR magnet system.

32. (Original) The method of claim 26 wherein the step of heating portions of the recondensing system to melt ice deposits includes heating the ice deposits to release gas particles and the step of vacuumously removing includes vacuumously removing the gas particles.

33. (New) The system of claim 1 wherein the at least one heating element is configured to melt iced particles forming on an outer surface of the recondensing system, inside the sealed vessel.

34. (New) The system of claim 33 wherein the sealed vessel contains a substantial vacuum therein and wherein the at least one heating element is configured to melt ice particles formed of air contaminating the substantial vacuum of the sealed vessel.

35. (New) The recondensor system of claim 10 further comprising a sealed vacuum vessel enclosing the superconducting magnet, the recondensor, the supply tube, the delivery tube, and the at least one resistive element.

36. (New) The recondensor system of claim 35 wherein the at least one resistive element is configured to melt ice particles formed of air contaminating the sealed vacuum vessel.